

# SURGE PROTECTION DEVICES



 **Lovato**  
**electric**

ENERGY AND AUTOMATION

# SPD SYSTEM CONFIGURATOR

## INSTALLED IN THE ENERGY POINT OF DELIVERY (230/400VAC)

### HV system |

Typical case: large industrial or commercial plant with cabin inside the final user's plant.

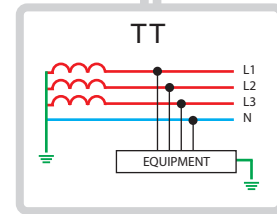
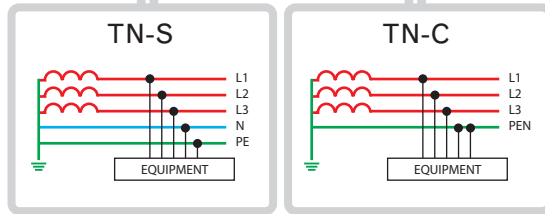


### LV system |

Typical case: small/medium industrial/commercial plant or residential plant.



**DISTRIBUTION SYSTEM**



SPD **before** the first plant residual circuit breaker

SPD **after** the first plant residual circuit breaker

	SINGLE-PHASE	THREE-PHASE + NEUTRAL	THREE-PHASE	SINGLE-PHASE	THREE-PHASE + NEUTRAL	SINGLE-PHASE	THREE-PHASE + NEUTRAL
<b>URBAN AREA</b>	SG22PA300	SG24PA300	SG23PA300	SG21NA300	SG23NA300	SG22PA300	SG24PA300
<b>NON-URBAN AREA</b>	SA0B2PA320R	SA0B4PA320R	SA0B3PA320R	SA01NA320R	SA03NA320R	SA02PA320R	SA04PA320R
<b>EXPOSED NON-URBAN AREA</b>	SA1B2PA320R	SA1B4PA320R SA1F34A275R	SA1B3PA320R	SA1B1NA320R	SA1B3NA320R SA1F34A275R	SA1B2PA320R	SA1B4PA320R SA1F34A275R

**LOVATO ELECTRIC SPD TYPE TO BE CHOSEN DEPENDING ON THE AREA**

- URBAN AREA:** Area subjected to induced overvoltages with 8/20 $\mu$ s waveform (SPD Type 2).
- NON-URBAN AREA:** An area subjected to major direct lightning strikes with a 10/350 $\mu$ s waveform and to induced overvoltages with an 8/20 $\mu$ s waveform (SPD Types 1 and 2).
- EXPOSED NON-URBAN AREA:** An area subjected to large direct lightning strikes with a 10/350 $\mu$ s waveform and induced overvoltages with an 8/20 $\mu$ s waveform (SPD Types 1 and 2).

**NOTE:** This scheme represents typical configurations. In any case, the choice of the SPDs must be made in accordance with CEI64-8 and with any applicable standards for the plant design.

# TN-S SYSTEM INDUSTRIAL PLANT TYPICAL SIZING, THREE-PHASE + NEUTRAL

- A** SPD TYPE 1 E 2 Iimp = 25kA/pole  
(ex.: SA1B4PA320R - SA1F34A275R)

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- B** SPD TYPE 1 E 2 Iimp = 12,5kA/pole  
(ex.: SA0B4PA320R)

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- C** SPD TYPE 2 In = 20kA/pole  
(ex.: SG24PA300R)

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- D** SPD TYPE 2 In = 5kA/pole  
(ex.: SG2C2PA320)

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- E** SPD TYPE 3  
Fitting on DIN rail  
(ex.: SA31NA320R)

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- F** SPD TYPE 3  
Direct fitting, parallel to the load  
(ex.: SA31NA275MS / SA31NA275ML)

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- G** SPD TYPE C2-D1  
RS485 line protection  
(ex.: SASD5VR)

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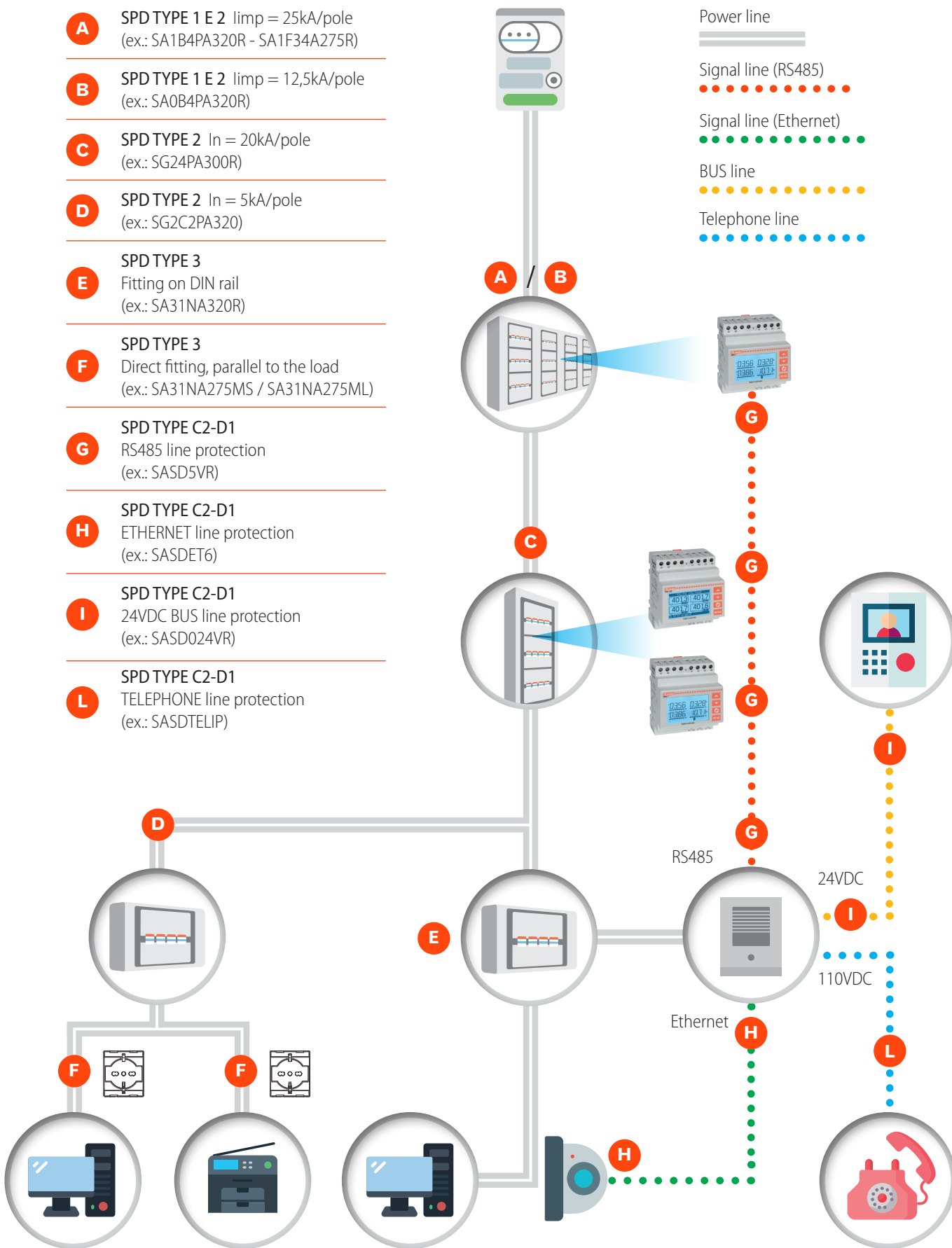
- H** SPD TYPE C2-D1  
ETHERNET line protection  
(ex.: SASDET6)

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- I** SPD TYPE C2-D1  
24VDC BUS line protection  
(ex.: SASD024VR)

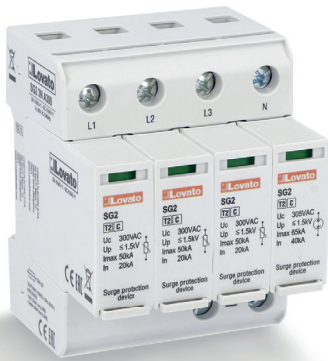
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- L** SPD TYPE C2-D1  
TELEPHONE line protection  
(ex.: SASDTLIP)



# SURGE PROTECTION DEVICES

## THREE-PHASE PLANTS, DELIVERY IN LV



Industrial plants



Residential complexes and public locations



Offices



AC side of three-phase photovoltaic systems

### Surge protection device wiring rules

- Wiring as illustrated in the figure.
- Connection length to the equipotential bar within 0.5 metres (b).
- Replace the protection plug device when the status indicator turns red.

## SINGLE-PHASE PLANTS, DELIVERY IN LV



Homes



AC side of three-phase photovoltaic systems

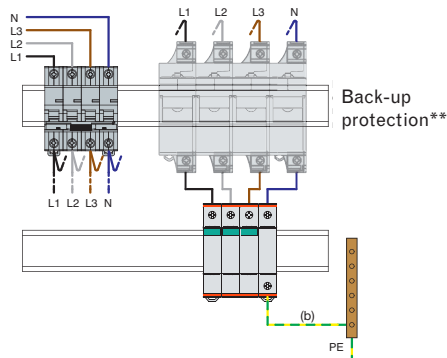
### Surge protection device wiring rules

- Wiring before the first plant residual circuit breaker.
- In/out wiring as shown in the figure below.
- Connection length to the equipotential bar within 0.5 metres (b).
- Replace the protection plug residual current breaker device when the status indicator turns red.

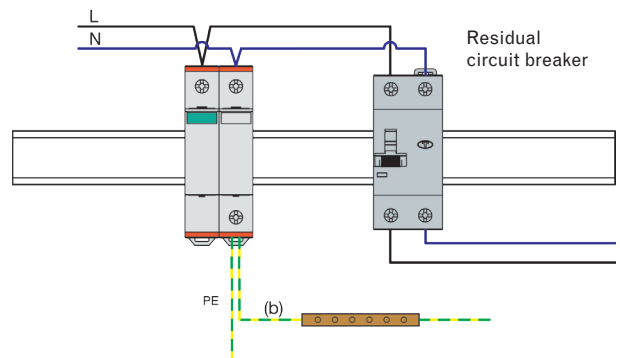
Area	Type	Discharge capacity	Order code	DIN modules
URBAN	2	In 20kA (8/20)	<b>SG23NA300</b>	4
NON-URBAN	1-2	limp 12.5kA (10/350)	<b>SA03NA320R</b>	4
NON-URBAN EXPOSED AREA*	1-2	limp 25kA (10/350)	<b>SA1B3NA320R</b>	8
			<b>SA1F34A275R</b>	

Area	Type	Discharge capacity	Order code	DIN modules
URBAN	2	In 20kA (8/20)	<b>SG21NA300</b>	2
		In 5kA (8/20)	<b>SG2C1NA320</b>	1
NON-URBAN	1-2	limp 12.5kA (10/350)	<b>SA01NA320R</b>	2
NON-URBAN EXPOSED AREA*	1-2	limp 25kA (10/350)	<b>SA1B1NA320R</b>	4

### Installation and wiring



### Installation and wiring

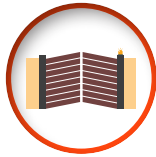
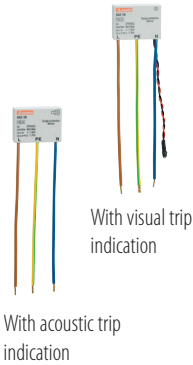


\* Large direct lightning strikes.

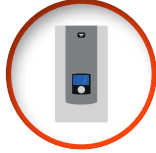
\*\* Back-up protection required when line thermal-magnetic circuit breaker is higher than 125 A (SA1B.. AND SG2..), 80A (SA0..).

It is never needed for SA1F34A275R.

# PLANTS WITH ELECTRONIC EQUIPMENT



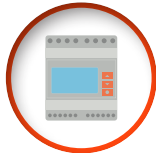
Electric gate



Boilers / Stoves Air Conditioners



TVs / PCs



Electronic control units

## Surge protection device wiring rules

### DIN guide

- Connection length to the equipotential bar within 0.5 metres (b).
- Replace the plug when the status indicator turns red.

### Plug-in solution

- Replace the protection device when the visual signalling turns off or when the audible signalling activates.

# PLANTS WITH DATA LINES



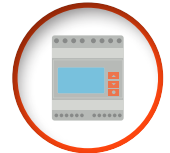
Videocameras



Switch Router



TVs / PCs



Electronic control units  
Measurement devices



Telephone line

## Surge protection device wiring rules

### RS485

- Rated voltage Un: 5VDC
- Replace the plug if the signal is lacking.

### Ethernet Cat. 6 - POE

- Rated voltage Un: 48VDC
- Replace the protection device if the signal is lacking.

### Data line - BUS

- Rated voltage Un: 30VDC
- Bandwidth: 30MHz.

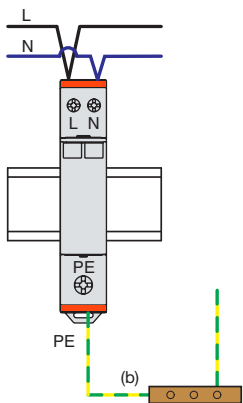
### Telephone line 110VDC

- For DIN rail installation
- For outdoor installation IP66.

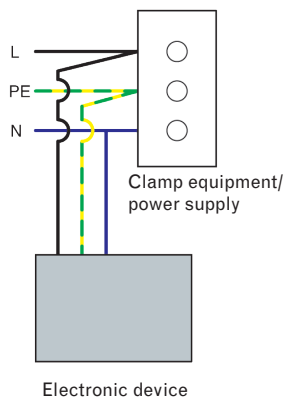
Application	Type	Order code	Install.	Trip indication
Installation near the equipment to be protected	3	SA31NA320R	DIN guide	Series relays
		SA31NA275MS	Box 503, board, duct	Audible
		SA31NA275ML		Visual

## Installation and wiring

### DIN guide



### Plug-in solution



Application	Type	Order code	Instal.	DIN modules
RS485	C2-D1	SASD5VR	DIN guide	1/2
Ethernet Cat. 6 Power over Ethernet (POE)		SASDET6		1
Data lines - BUS 24VDC	C2-D1	SASD024VR	DIN guide	1
Telephone lines 110VDC	C2-D1	SASDTELDIN	DIN guide	1
Telephone lines 110VDC - IP66	C2-D1	SASDTELIP	Outdoor installation	-



# PHOTOVOLTAIC SYSTEMS



DC side of photovoltaic systems

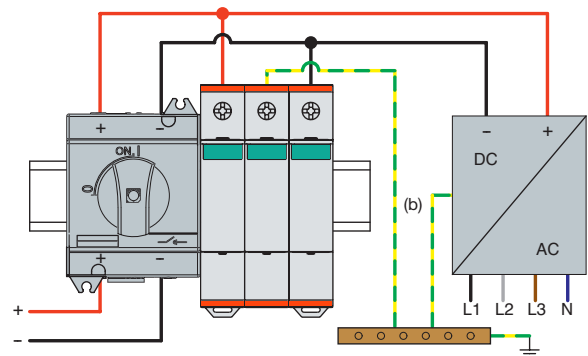


## Surge protection device wiring rules

- Wiring as illustrated in the figure.
- Connection length to the equipotential bar within 0.5 metres (b), with a minimum section of 6mm<sup>2</sup>.
- Replace the protection plug device when the status indicator turns red.



## Installation and wiring



Max. rated voltage	Type	Short circuit current I <sub>scpv</sub>	Order code	DIN modules
600VDC	2	11kA	<b>SG2DG600M2</b>	2
1100VDC	2	9kA	<b>SA2EDGK10M3</b>	3
1500VDC	2	11kA	<b>SG2DGK50M3</b>	3
1100VDC	1-2	11kA	<b>SG2EDGK10M3R</b>	3
1500VDC	1-2	30kA	<b>SG2EDGK50M3R</b>	3

Order code	Type	Rated voltage	Max. continuous voltage	Protection level	Rated current	Maximum current	Short circuit current	Backup fuse gPV (A)	DIN modules	Relay output	Cartridge
	IEC/EN 61643-11	U <sub>n</sub> (VDC)	U <sub>cpv</sub> (VDC)	U <sub>p</sub> (kV) (L-N/N-PE)	I <sub>n</sub> 8/20 (kA) pole	I <sub>max</sub> 8/20 (kA) pole	I <sub>scpv</sub> (kA)				
SG2DG600M2	2	600	600	< 1,9	15	30	11	-	2	-	Yes
SG2DG600M2R	2	600	600	< 1,9	15	30	11	-	2	Yes	Yes
SG2DGK10M3	2	1100	1100	< 3,8	20	40	11	-	3	-	Yes
SG2DGK10M3R	2	1100	1100	< 3,8	20	40	11	-	3	Yes	Yes
SA2EDGK10M	2	1100	1100	< 4	20	40	9	-	3	-	Yes
SG2DGK50M3	2	1500	1500	< 5	20	30	11	-	3	-	Yes
SG2EDGK10M3R	1-2	1100	1100	<3,8	20	40	11	-	3	Yes	Yes
SG2EDGK50M3R	1-2	1500	1500	<4,5	20	60	30	-	3	Yes	Yes

## ORDER CODES

Order code	Pole arrangement	Rated voltage	Max. continuous voltage	Protection level	Pulse current	Rated current	Maximum current	Short circuit current	Backup fuse gl/gg	Immunity to TOV	DIN modules	Relay output
		Un (VAC)	Uc (V)	Up (kV) (L-N/N-PE)	Imp 10/350 (kA) pole	In 8/20 (kA) pole	I <sub>max</sub> 8/20 (kA) pole	I <sub>sc</sub> 50 Hz (kA)	A	V		
<b>SPD TYPE 1-2 monoblock</b>												
SA1B1NA320R	1P+N	230	320	< 1.4 / < 1.3	25	25	100	50	250	Yes - 335 V	4	Yes
SA1B2PA320R	2P	230	320	< 1.4	25	25	100	50	250	Yes - 335 V	4	Yes
SA1B3PA320R	3P	230/400	320	< 1.4	25	25	100	50	250	Yes - 335 V	6	Yes
SA1B3NA320R	3P+N	230/400	320	< 1.4 / < 1.5	25	25	100	50	250	Yes - 335 V	8	Yes
SA1B4PA320R	4P	230/400	320	< 1.4	25	25	100	50	250	Yes - 335 V	8	Yes
<b>SPD TYPE 1-2 with removable cartridge</b>												
SA1F3A4275R	3P+N/4P	240	375	< 1,5	25	25	65	100	<b>NO</b>	Yes	8	Yes
SA01NA320R	1P+N	230	320	< 1.5 / < 1.7	12,5	25	60	25	160	Yes - 335 V	2	Yes
SA02PA320R	2P	230	320	< 1.5	12,5	25	60	25	160	Yes - 335 V	2	Yes
SA03PA320R	3P	230/400	320	< 1.5	12,5	25	60	25	160	Yes - 335 V	3	Yes
SA03NA320R	3P+N	230/400	320	< 1.5 / < 1.7	12,5	25	60	25	160	Yes - 335 V	4	Yes
SA04PA320R	4P	230/400	320	< 1.5	12,5	25	60	25	160	Yes - 335 V	4	Yes
<b>SPD TYPE 1-2 monoblock</b>												
SA0B1NA320R	1P+N	230	320	< 1.5 / < 1.5	12,5	20	50	50	250	Yes - 335 V	2	Yes
SA0B2PA320R	2P	230	320	< 1.5	12,5	20	50	50	250	Yes - 335 V	2	Yes
SA0B3PA320R	3P	230/400	320	< 1.5	12,5	20	50	50	250	Yes - 335 V	3	Yes
SA0B3NA320R	3P+N	230/400	320	< 1.5 / < 1.5	12,5	20	50	50	250	Yes - 335 V	4	Yes
SA0B4PA320R	4P	230/400	320	< 1.5	12,5	20	50	50	250	Yes - 335 V	4	Yes
<b>SPD TYPE 2 with removable cartridge</b>												
SG21NA300	1P+N	230	300	< 1.5 / < 1.5	-	20	50	25/50	315/250	Yes - 337 V	2	No
SG21NA300R	1P+N	230	300	< 1.5 / < 1.5	-	20	50	25/50	315/250	Yes - 337 V	2	Yes
SG22PA300	2P	230	300	< 1.5	-	20	50	25/50	315/250	Yes - 337 V	2	No
SG22PA300R	2P	230	300	< 1.5	-	20	50	25/50	315/250	Yes - 337 V	2	Yes
SG23PA300	3P	230/400	300	< 1.5	-	20	50	25/50	315/250	Yes - 337 V	3	No
SG23PA300R	3P	230/400	300	< 1.5	-	20	50	25/50	315/250	Yes - 337 V	3	Yes
SG23NA300	3P+N	230/400	300	< 1.5 / < 1.5	-	20	50	25/50	315/250	Yes - 337 V	4	No
SG23NA300R	3P+N	230/400	300	< 1.5 / < 1.5	-	20	50	25/50	315/250	Yes - 337 V	4	Yes
SG24PA300	4P	230/400	300	< 1.5	-	20	50	25/50	315/250	Yes - 337 V	4	No
SG24PA300R	4P	230/400	300	< 1.5	-	20	50	25/50	315/250	Yes - 337 V	4	Yes
SG2C1NA320	1P+N	230	320	< 1.5	-	5	15	6	63	Yes - 335 V	1	No
SG2C2PA320	2P	230	320	< 1.5	-	5	15	6	63	Yes - 335 V	1	No
<b>SPD TIPO 3</b>												
SA31NA320R*	1P+N	230	320	< 1.5	-	-	-	10	63	Yes - 337 V	1	Yes
SA31NA275MS**	1P+N	230	275	< 1.5 / < 1.7	-	-	-	1	16**	Yes - 337 V	-	No
SA31NA275ML**	1P+N	230	275	< 1.5 / < 1.7	-	-	-	1	16**	Yes - 337 V	-	No

\* SPD with removable cartridge \*\* SPD with reduced dimensions, protection MCB/B 16A.

### SPD FOR PLANTS WITH DATA LINES

Order code	Type	Rated voltage	Max. continuous voltage	Protection level	D1 Pulse current	C2 Rated current	Maximum current	Bandwidth	Current of iL load at 25°C	DIN modules	Relay output	Monoblock	Cartridge
	IEC/EN 61643-21	Un (VDC)	Uc (VDC)	Up (V) (line-line/line-PE)	Imp 10/350 (kA)	In 8/20 (kA)	I <sub>max</sub> 8/20 (kA)	Mhz	A				
SASD5VR	D1/C1 C2/C3	5	6	<10	2,5	10	20	30	1	0,5	Yes	-	Yes
SASDET6		48	50	<150	1	10	10	250 Cat.6	1	1	-	Yes	-
SASD024VR		30	33	<43	2,5	10	20	30	1	0,5	Yes	-	Yes
SASDTELDIN		1100	170	<264	2,5	10	20	30	1	0,5	-	-	Yes
SASDTELIP		1100	180	<250	7,5	10	20	250	0,6	-	-	Yes	-



# ■ SURGE PROTECTION DEVICES



ENERGY AND AUTOMATION

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